REMARKS

Claims 67-75 and 92-98 are pending in the application.

Rejection of Claims 67-75 and 92-98 for Lack of Written Description

Claims 67-75 and 92-98 stand rejected under 35 U.S.C. § 112, ¶1 as failing to comply with the written description requirement. The application discloses that a "shopper using a computer with a Domain Name System (DNS) entry in New York vs. Washington vs. Colorado entering the same domain name to access may also receive different displayed information." P. 4, ln. 27 to P. 5, ln. 1. The Office Action states the application "does not have support to enable one of ordinary skill in the art to use applicant's claimed and argued invention to use DNS to determine the current location of the user." In other words, the Office Action asserts one of ordinary skill would not have known how to determine the location of the remote computer using only its DNS entry (i.e., IP address).

While IP addresses do not contain any geographic information and are assigned without regard to geographic location, at the time the application was filed, several methods of determining the location would have been available to and known by one of ordinary skill. In other words, if asked to determine the location of a remote system based on its IP address, would one of ordinary skill in the art at the time the application was filed (February 22, 2000) have known how to make that determination using any one of the following exemplary tools.

The domain name system ("DNS") is fundamental to the transfer of information across the Internet. The DNS includes name servers that map each domain name to an IP address. Whenever a user (such as the shopper) enters a domain address, one or more name servers are queried to determine the IP address of the host system associated with the domain name. "[I]nverse inquires [in which an IP address is presented to the DNS system] have been part of the domain system since it was first specified...." Douglas E. Comer, *Internetworking with TCP/IP Vol 1: Principles, Protocols, and Architecture*, 329-331 (2nd Ed. 1991). This reference also explains how to formulate a "pointer query" to determine the domain name associated with an IP

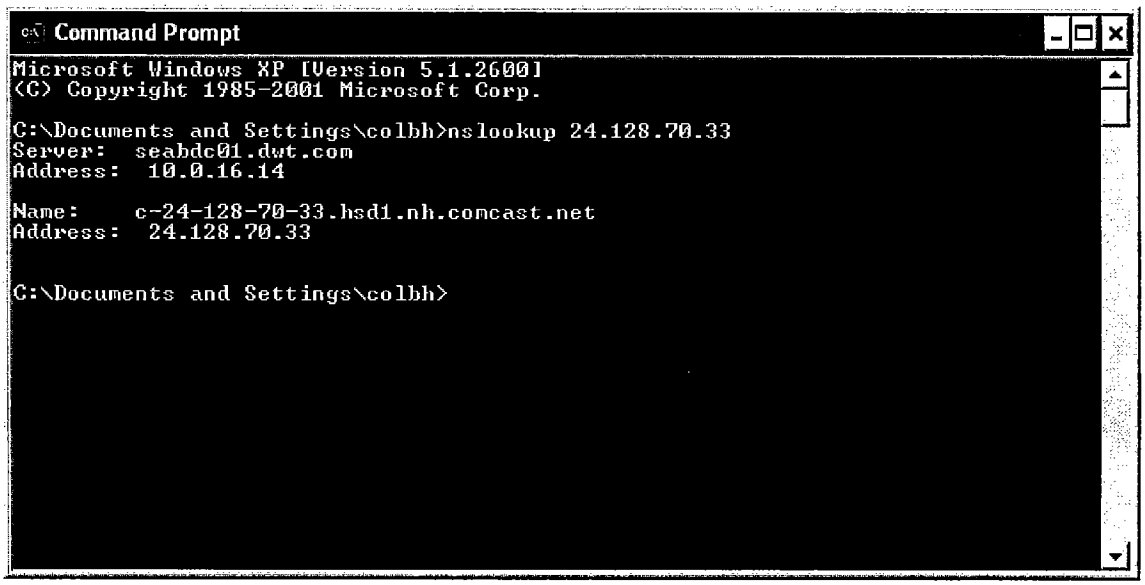
address. As this was known for at least ten years before the filing of the present application, it was surely known by one of ordinary skill in the art who is presumed to have knowledge of the prior art. Therefore, using only the IP address, one of ordinary skill would have known how to obtain the domain name associated with that IP address.

The domain name itself may include location information. In such circumstances, the inverse DNS lookup alone could be used to determine the location of the remote computer. An example of such a query is provided on page 12 of applicant's May 30, 2006 response to Examiner's request for information under 37 CFR 1.105. In this example, a lookup of the IP address 24.128.70.33 identified the domain name c-24-128-70-33.hsd1.nh.comcast.net, which indicates it is located in "nh" or New Hampshire.

The attached *A Primer on Internet and TCP/IP Tools*, published in 1994, describes a tool named "nslookup" which may be used to perform the inverse DNS lookup. G. Kessler and S. Shepard, *A Primer on Internet and TCP/IP Tools*, Request for Comment (RFC) No. 1739, The Internet Engineering Task Force, Networking Working Group (December 1994). If the Examiner is using MS Windows and wishes to use nslookup, simply do the following:

1. Go to the "Start" button;
2. Select "All Programs;"
3. Select "Accessories;"
4. Within "Accessories," select the "Command Prompt;"
5. Enter the following command into the "Command Prompt" window: **nslookup 24.128.70.33**.

The following results should appear:



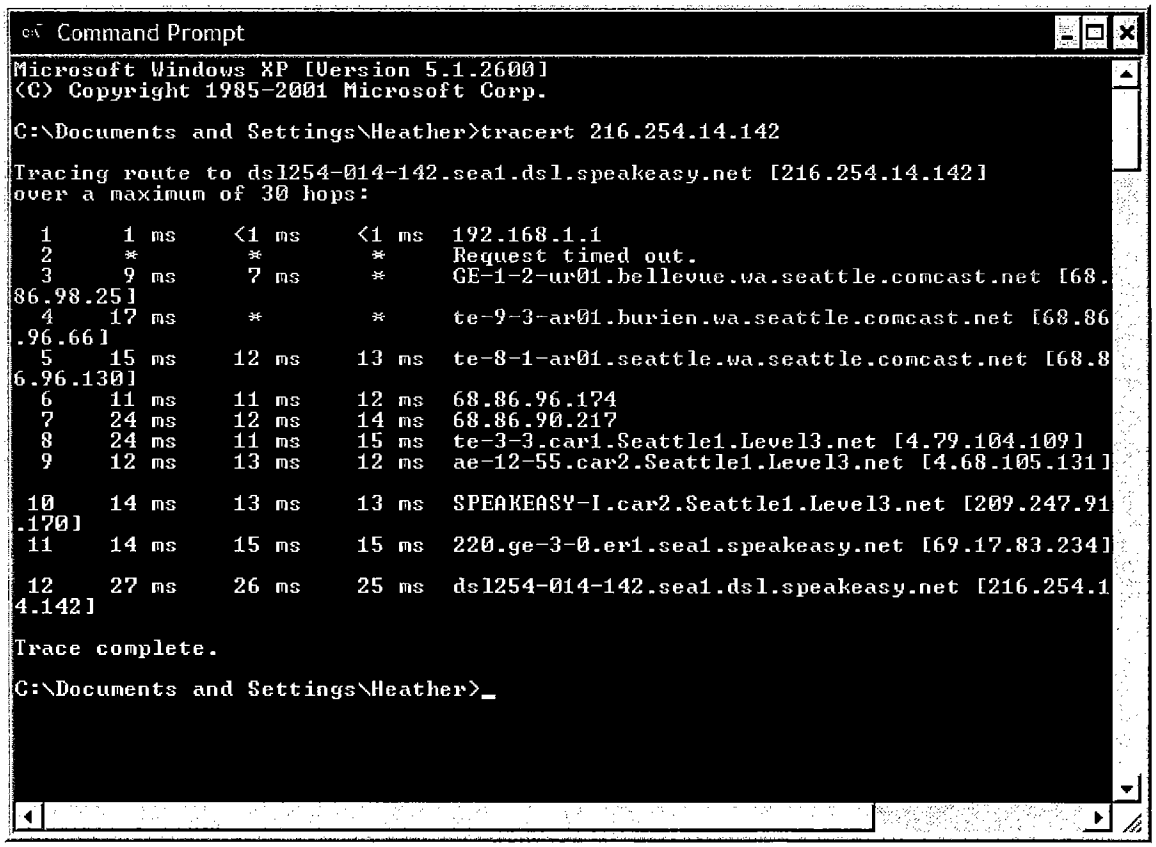
If the Examiner experiences difficulty verifying this result, the Examiner is invited to contact the undersigned at (206) 757-8133.

Another example of a method of using the IP address to determine a location (also explained in applicant's May 30, 2006 response to Examiner's request for information under 37 CFR 1.105) includes using the "traceroute" tool which may be used to map the route taken by packets communicated from the remote computer to the host system and vise versa. Amendment, filed May 30, 2006, pp 15-16. Please see attached *A Primer on Internet and TCP/IP Tools*, which clearly demonstrates traceroute was a well known tool before the filing of the present application. Page 8 provides an explanation of an example traceroute result shown on page 9. The explanation clearly identifies the communication is carried on a regional New Jersey network immediately prior to delivery to its destination, Bellcore in Red Bank, New Jersey. Therefore, information obtained using traceroute could be used to infer the location of the remote computer, which in this case was New Jersey.

If the Examiner is using MS Windows and wishes to use traceroute (which corresponds to the "tracert" command in Windows), simply do the following:

1. Go to the "Start" button;
2. Select "All Programs;"
3. Select "Accessories;"
4. Within "Accessories," select the "Command Prompt;"
5. Enter the following command into the "Command Prompt" window: **tracert 216.254.14.142**.

Results similar to those shown below should appear. Because the Examiner's route to 216.254.14.142 starts from a different location than that indicated below, the Examiner's tracert results will not be identical to those shown. Please note, like the results in applicant's May 30, 2006 response to Examiner's request for information under 37 CFR 1.105, these results indicate the nearest backbone router is in Seattle.



Another exemplary method involves looking up the IP address in the American Registry for Internet Numbers ("ARIN") database. ARIN was established in 1997 as one of five regional internet registries for IP addresses (not domain names). ARIN's service region includes the United States. At the time the application was filed, the ARIN database could be queried for information related to the owner of an IP address. An online version can be viewed today at http://www.arin.net/index.shtml. As explained in applicant's May 30, 2006 response to Examiner's request for information under 37 CFR 1.105, a search of the network name portion of the IP address 24.127.74.33, which is 24.127.0.1, indicated the network was located in Los Angeles. However, applicant notes that the ARIN database now indicates the location of the network is Richmond. Applicant invites the examiner to visit the ARIN website and enter the IP address of the exemplary remote computer and/or its network to view the results of such a query.

Another exemplary method involves using a "whois" tool, described on page 17 of the attached *A Primer on Internet and TCP/IP Tools*. The whois tool returns point-of-contact information such as the address of the registrant and/or the address of the administrative contact. See also Amendment, filed May 30, 2006, pp 12. Therefore, whois is yet another tool that would have been known to and used by those of ordinary skill at the time the application was filed.

Obviously, more than one of these methods may be used to increase the confidence of the host system that the correct location was determined. Therefore, one of ordinary skill would have known how to determine the location of a remote computer given only its IP address and a detailed description of such methods is not necessary to enable the invention recited by the pending claims. Applicant notes that Claims 92-96 and 98 do not recite how the location is determined. Instead, these claims recite the determination of additional information about the computer based on the network address of the computer. As discussed above, the IP address can be used to determine additional information about the computer (including its location, communication routing information, registrant information, etc.). Consequently, applicant respectfully requests withdrawal of the rejection under Section 112 with respect to claims 67-75 and 92-98.

Rejection of Claims 67-75 and 92-98 as Obvious

Claims 67-75 and 92-98 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,332,127 issued to Bandera et al. in view of U.S. Patent No. 6,286,045 issued to Griffiths et al. As indicated in the Office Action, Bandera et al. does not teach a presentation formulator configured to formulate tailored store screens to be displayed on the remote computers of shoppers. Griffiths et al. teaches a method of selecting a banner for display on a web page that more accurately counts the number of times the banner is displayed. The method involves sending a banner request signal from the user's terminal to a recipient that serves a banner to the user's terminal. Col. 15, lns. 4-18. Griffiths et al. does not teach either a store or using the location of the user's terminal to formulate tailored store screens. At least because Bandera et al., Griffiths et al., and a combination thereof all fail to teach this element of the claims, applicant respectfully request withdrawal of this rejection.

With respect to claims 68-71, neither Bandera et al. nor Griffiths et al. mention a search request entered by the shopper into the shopper's computer to navigate to the host system to initiate the current communication. Therefore, neither reference nor a combination thereof renders the invention of these claims obvious.

With respect to claim 72, neither Bandera et al. nor Griffiths et al. mention the location of the shopper's computer at the time of the current communication, as determined by the shopper data collector, is used by the shopper data collector to determine for the current communication particular traits, habits, or interests of the shopper or other pertinent shopper information. Griffiths does not mention using the location of the user for any purpose and Bandera et al. discusses adapting the advertisements based only on location, and time, user traits, habits, and interests are never discussed. Therefore, neither reference nor a combination thereof renders the invention of claim 72 obvious.

With respect to claim 94 and 96, Bandera et al. never mentions using DNS. Instead, the reference discusses using GPS, a telephone trace, a cellular base station, and a satellite beam to determine additional information about the computer that is in

addition to the identity of the computer's network address. See Col. 6, lns. 49-51; Col. 6, lns. 62-66; Col. 7, lns. 1-8. While Griffiths mentions DNS, it is for the purposes of locating banners to send to the user, not to determine the location of the user. Therefore, neither reference nor a combination thereof renders the invention of claims 94 and 96 obvious.

Commissioner is hereby authorized to charge any additional fees if believed necessary, or to charge any deficiency or credit any overpayment to Deposit Account No. 04-0258.

All of the claims remaining in the application are now believed to be allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

If questions remain regarding this application, the Examiner is invited to contact the undersigned at (206) 757-8133.

Respectfully submitted,
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Internetworking With TCP/IP

Vol I:

Principles, Protocols, and Architecture

Second Edition

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Library of Congress Cataloging-in-Publication Data

Comer, Douglas E.
Internetworking with TCP/IP / Douglas E. Comer. -- 2nd ed.
p. cm.
Includes bibliographical references (v. 1, p.) and index.
Contents: vol. 1. Principles, protocols, and architecture.
ISBN 0-13-468505-9 (v. 1)
1. Computer networks. 2. Computer network protocols. 3. Data transmission systems. I. Title.
TK5105.5.C59 1991
004.6--dc20

90-7829
CIP

Editorial/production supervision: Joe Scordato
Cover design: Karen Stephens
Cover illustration: Jim Kinstrey
Manufacturing buyers: Linda Behrens and Patrice Fraccio

Printed in the United States of America

10 9 8 7 6 5 4 3

ISBN 0-13-468505-9

Prentice-Hall International (UK) Limited, *London*
Prentice-Hall of Australia Pty. Limited, *Sidney*
Prentice-Hall Canada Inc., *Toronto*
Prentice-Hall Hispanoamericana, S. A., *Mexico*
Prentice-Hall of India Private Limited, *New Delhi*
Prentice-Hall of Japan, Inc., *Tokyo*
Simon & Schuster Asia Pte. Ltd., *Singapore*
Editora Prentice-Hall do Brasil, Ltda., *Rio de Janeiro*

We said that the client takes responsibility for the expansion of such abbreviations, but it should be emphasized that such abbreviations are not part of the domain name system itself. The domain system only allows lookup of a fully specified domain name. As a consequence, programs that depend on abbreviations may not work correctly outside the environment in which they were built. We can summarize:

> *The domain name system only maps full domain names into addresses; abbreviations are not part of the domain name system itself, but are introduced by client software to make local names convenient for users.*

20.17 Inverse Mappings

We said that the domain name system can provide mappings other than machine name to IP address. *Inverse queries* allow the client to ask a server to map "backwards" by taking an answer and generating the question that would produce that answer. Of course, not all answers have a unique question. Even when they do, a server may not be able to provide it. Although inverse queries have been part of the domain system since it was first specified, they are generally not used because there is often no way to find the server that can resolve the query without searching the entire set of servers.

20.18 Pointer Queries

One form of inverse mapping is so obviously needed that the domain system supports a special domain and a special form of question called a *pointer query* to answer it. In a pointer query, the question presented to a domain name server specifies an IP address encoded as a printable string in the form of a domain name (i.e., a textual representation of digits separated by periods). A pointer query requests the name server to return the correct domain name for the machine with the specified IP address. Pointer queries are especially useful for diskless machines because they allow the system to obtain a high-level name given only an IP address. (We have already seen in Chapter 6 how a diskless machine can obtain its IP address.)

Pointer queries are not difficult to generate. If we think of an IP address written in dotted-decimal form, it has the following format:

aaa.bbb.ccc.ddd

To form a pointer query, the client rearranges the dotted decimal representation of the address into a string of the form:

ddd.ccc.bbb.aaa.in-addr.arpa

The new form is a name in the special *in-addr.arpa* domain†. Because the local name server may not be the authority for either the *arpa* domain or the *in-addr.arpa* domain, it may need to contact other name servers to complete the resolution. To make the resolution of pointer queries efficient, the Internet root domain servers maintain a database of valid IP addresses along with information about domain name servers that can resolve each address.

20.19 Object Types And Resource Record Contents

We have mentioned that the domain name system can be used for translating a domain name to a mail exchanger address as well as for translating a host name to an IP address. The domain system is quite general in that it can be used for arbitrary hierarchical names. For example, one might decide to store the names of available computational services along with a mapping from each name to the telephone number to call to find out about the corresponding service. Or one might store names of protocol products along with a mapping to the names and addresses of vendors that offer such products.

Recall that the system accommodates a variety of mappings by including a *type* in each resource record. When sending a request, a client must specify the type in its query†; servers specify the data type in all resource records they return. The type determines the contents of the resource record according to the table in Figure 20.9

Type	Meaning	Contents
A	Host Address	32-bit IP address
CNAME	Canonical Name	Canonical Domain Name for an alias
HINFO	CPU & OS	Name of CPU and Operating System
MINFO	Mailbox info	Information about a mailbox or mail list
MX	Mail Exchanger	16-bit preference and name of host that acts as mail exchanger for the domain
NS	Name Server	Name of authoritative server for domain
PTR	Pointer	Domain name (like a symbolic link)
SOA	Start of Authority	Multiple fields that specify which parts of the naming hierarchy a server implements
TXT	Arbitrary text	Uninterpreted string of ASCII text

Figure 20.9 Domain Name System resource record types.

Most data is of type *A*, meaning that it consists of the name of a host attached to the Internet along with the host's IP address. The second most useful domain type, *MX*, is assigned to names used for electronic mail exchangers. It allows a site to specify multiple machines that are each capable of accepting mail. When sending electronic mail, the user specifies an electronic mail address in the form *user@domain-part*. The mail

†The octets of the IP address must be reversed when forming a domain name because IP addresses have the most significant octets first while domain names have the least-significant octets first.

†Queries can specify a few additional types (e.g., there is a query type that requests all resource records).

system uses the domain name system to resolve *domain-part* with query type *MX*. The domain system returns a set of resource records that each contain a preference field and a host's domain name. The mail system steps through the set from highest preference to lowest (lower numbers mean higher preference). For each *MX* resource record, the mailer extracts the domain name and uses a type *A* query to resolve that name to an IP address. It tries to contact the host and deliver mail. If the host is unavailable, the mailer will continue trying other hosts on the list.

To make lookup efficient, a server always returns additional bindings that it knows in the *ADDITIONAL INFORMATION SECTION* of a response. In the case of *MX* records, a domain server can use the *ADDITIONAL INFORMATION SECTION* to return type *A* resource records for domain names reported in the *ANSWER SECTION*. Doing so substantially reduces the number of queries a mailer sends to its domain server.

20.20 Obtaining Authority For A Subdomain

Before an institution is granted authority for an official second-level domain, it must agree to operate a domain name server that meets Internet standards. Of course, a domain name server must obey the protocol standards that specify message formats and the rules for responding to requests. The server must also know the addresses of servers that handle each subdomain (if any exist) as well as the address of at least one root server.

In practice, the domain system is much more complex than we have outlined. In most cases, a single physical server may handle more than one part of the naming hierarchy. For example, a single name server at Purdue University handles both the second-level domain *purdue.edu* as well as the geographic domain *laf.in.us*. A subtree of names managed by a given name server forms a *zone of authority*. Another practical complication arises because servers must be able to handle many requests, even though some requests take a long time to resolve. Usually, servers support concurrent activity, allowing work to proceed on later requests while earlier ones are being processed. Handling requests concurrently is especially important when the server receives a recursive request that forces it to send the request on to another server for resolution.

Server implementation is also complicated because the Internet authority requires that the information in every domain name server be replicated. Information must appear in at least two servers that do not operate on the same computer. In practice, the requirements are quite stringent: the servers must have no single common point of failure. Avoiding common points of failure means that the two name servers cannot both attach to the same network; they cannot even obtain electrical power from the same source. Thus, to meet the requirements, a site must find at least one other site that agrees to operate a backup name server. Of course, at any point in the tree of servers, a server must know how to locate both the primary and backup name servers for subdomains, and it must direct queries to a backup name server if the primary server is unavailable.

Network Working Group
Request for Comments: 1739
Category: Informational

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Hill Associates, Inc.

December 1994

A Primer On Internet and TCP/IP Tools

Status of this Memo

This memo provides information for the Internet community. This memo does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Table of Contents

1. Introduction

This memo is an introductory guide to some of the TCP/IP and Internet tools and utilities that allow users to access the wide variety of information on the network, from determining if a particular host is up to viewing a multimedia thesis on foreign policy. It also describes discussion lists accessible from the Internet, ways to obtain Internet documents, and resources that help users weave their way through the Internet. This memo may be used as a tutorial for individual self-learning, a step-by-step laboratory manual for a course, or as the basis for a site's users manual. It is intended as a basic guide only and will refer to other sources for more detailed information.

2. A Beginner's Guide to TCP/IP-based Utilities and Applications

This section provides descriptions and detailed examples of several TCP/IP utilities and applications, including actual sessions using these utilities (with some extraneous information removed). Each section below describes a single TCP/IP-based tool, it's application, and, in some cases, how it works. The text description is followed by an actual sample session.

The sample dialogues shown below were made using the Multinet TCP/IP software for VAX/VMS or DOS versions of FTP Software's PC/TCP. While the examples below can be used as a guide to using and learning about the capabilities of these tools, the reader should understand that not all of these utilities may be found at all TCP/IP hosts nor in all commercial software packages. Furthermore, the user interface for different packages will be different and the actual command line may appear differently than shown here; this will be particularly true for graphical user interfaces running over Windows, X-Windows, OS/2, or Macintosh systems. The Internet has many exciting things to offer but standardized interfaces to the protocols is not yet one of them! This guide will not provide any detail or motivation about the Internet Protocol Suite; more information about the TCP/IP protocols and related issues may be found in RFC 1180 [18], Comer [22], Feit [23], and Kessler [30].

In the commands shown in the descriptions below, any item appearing in square brackets ([]) is optional and the vertical-bar (|) means "or"; parameters appearing with no brackets or within curly brackets ({}) are mandatory. In the sample dialogues, most user input is in capital letters (only where allowed) and lines containing user input are designated with a "**" in the far-left margin.

AUTHOR'S NOTE: The sample dialogues are easier to read in the secondary, Postscript version of this RFC.

2.1. NSLOOKUP

NSLOOKUP is the name server lookup program that comes with many TCP/IP software packages. A user can use NSLOOKUP to examine entries in the Domain Name System (DNS) database that pertain to a particular host or domain; one common use is to determine a host system's IP address from its name or the host's name from its IP address. The general form of the command to make a single query is:

```
NSLOOKUP  [IP_address | host_name]
```

If the program is started without any parameters, the user will be prompted for input; the user can enter either an IP address or host name at that time, and the program will respond with the name and address of the default name sever, the name server actually used to resolve each request, and the IP address and host name that was queried. "Exit" is used to quit the NSLOOKUP application.

Three simple queries are shown in the example below:

1. Requests the address of the host named "emily.uvm.edu", a system at the University of Vermont (UVM). As it turns out, this is not the true name of the host, but a shortened version of the name that is accepted as an alias by the network. The full name of the host and the IP address are listed by NSLOOKUP.

2. Requests the address of host "emily.emba.uvm.edu", which is the same host as in the first query. Note that NSLOOKUP provides a "non-authoritative" answer. Since NSLOOKUP just queried this same address, the information is still in its cache memory. Rather than send additional messages to the name server, the answer is one that it remembers from before; the server didn't look up the information again, however, so it is not guaranteed to still be accurate (because the information might have changed within the last few milliseconds!).

3. Requests the name of the host with the given IP address. The result points to the Internet gateway to Australia, "munnari.oz.au".

One additional query is shown in the dialogue below. NSLOOKUP examines information that is stored by the DNS. The default NSLOOKUP queries examine basic address records (called "A records") to reconcile the host name and IP address, although other information is also available. In the final query below, for example, the user wants to know where electronic mail addressed to the "uvm.edu" domain actually gets delivered, since "uvm.edu" is not the name of an actual host. This is accomplished by changing the query type to look for

mail exchange (MX) records by issuing a "set type" command (which must be in lower case). The query shows that mail addressed to "uvm.edu" is handled though a mail server called "moose.uvm.edu". The DNS is beyond the scope of this introduction, although more information about the concepts and structure of the DNS can be found in STD 13/RFC 1034 [12] and RFC 1591 [13]. The "help" command can be issued at the program prompt for information about NSLOOKUP's more advanced commands.

TECHNICAL NOTE: There are other tools that might be available on your system or with your software for examining the DNS. Alternatives to NSLOOKUP include HOST and DIG.

```
   ================================================================
** SMCVAX$ NSLOOKUP

   Default Server:  LOCALHOST
   Address:  127.0.0.1

** > EMILY.UVM.EDU
   Server:  LOCALHOST
   Address:  127.0.0.1

   Name:    emily.emba.uvm.edu
   Address:  132.198.1.7
   Aliases:  emily.uvm.edu

** > EMILY.EMBA.UVM.EDU
   Server:  LOCALHOST
   Address:  127.0.0.1

   Non-authoritative answer:
   Name:    emily.emba.uvm.edu
   Address:  132.198.1.7

** > 128.250.1.21
   Server:  LOCALHOST
   Address:  127.0.0.1

   Name:    munnari.OZ.AU
   Address:  128.250.1.21

** > set type=MX
** > UVM.EDU
   Server:  LOCALHOST
   Address:  127.0.0.1

   uvm.edu preference = 10, mail exchanger = moose.uvm.edu
```

```
   moose.uvm.edu    internet address = 132.198.101.60

** > EXIT

   SMCVAX$
   ================================================================
```

2.2. PING

Ping is one of the most widely available tools bundled with TCP/IP software packages. Ping uses a series of Internet Control Message Protocol (ICMP) Echo messages to determine if a remote host is active or inactive, and to determine the round-trip delay in communicating with it. The Ping command, referred to as the Packet Internetwork Groper in some references, has the following general format:

```
     PING [-s] {IP_address | host_name} [size] [quantity]
```

In the first test below, we ping the host "thumper.bellcore.com" to determine whether it is up and running. This simple use of the command contains no optional parameters.

In the second test, the "-s" parameter tells the system to send an ICMP Echo message every second. The optional "size" parameter specifies that each message should be 64 bytes in length (which is the default size); the optional "quantity" parameter indicates that this test will only send 12 messages (the default is to run the test continuously until interrupted). The results of the second test displays the round-trip delay of each Echo message that is returned to the sending host; at the end of the test, summary statistics are displayed.

```
   ================================================================
** SMCVAX$ PING THUMPER.BELLCORE.COM
   thumper.bellcore.com is alive

** SMCVAX$ PING -S THUMPER.BELLCORE.COM  64  12
   PING THUMPER.BELLCORE.COM (128.96.41.1): 56 data bytes
   64 bytes from 128.96.41.1: icmp_seq=0 time=150 ms
   64 bytes from 128.96.41.1: icmp_seq=1 time=110 ms
   64 bytes from 128.96.41.1: icmp_seq=2 time=130 ms
   64 bytes from 128.96.41.1: icmp_seq=3 time=130 ms
   64 bytes from 128.96.41.1: icmp_seq=4 time=320 ms
   64 bytes from 128.96.41.1: icmp_seq=5 time=110 ms
   64 bytes from 128.96.41.1: icmp_seq=6 time=440 ms
   64 bytes from 128.96.41.1: icmp_seq=7 time=90 ms
   64 bytes from 128.96.41.1: icmp_seq=9 time=100 ms
   64 bytes from 128.96.41.1: icmp_seq=10 time=110 ms
```



```
   ----THUMPER.BELLCORE.COM PING Statistics----
```

```
12 packets transmitted, 10 packets received, 16% packet loss
round-trip (ms)  min/avg/max = 90/169/440

SMCVAX$
================================================================
```

2.3. FINGER

The Finger program may be used to find out who is logged in on another system or to find out detailed information about a specific user. This command has also introduced a brand new verb; "fingering" someone on the Internet is not necessarily a rude thing to do! The Finger User Information Protocol is described in RFC 1288 [20]. The most general format of the Finger command is:

```
FINGER [username]@host_name
```

The first example below shows the result of fingering an individual user at a remote system. The first line of the response shows the username, the user's real name, their process identifier, application, and terminal port number. Additional information may be supplied at the option of the user in "plan" and/or "project" files that they supply; these files are often named PLAN.TXT or PROJECT.TXT, respectively, and reside in a user's root directory (or somewhere in an appropriate search path).

The second example shows the result of fingering a remote system. This lists all of the processes currently running at the fingered system or other information, depending upon how the remote system's administrator set up the system to respond to the Finger command.


```
================================================================
** C:\> FINGER KUMQUAT@SMCVAX.SMCVT.EDU
```

```
   [smcvax.smcvt.edu]
   KUMQUAT  Gary Kessler            20A02991 MAIL          TXA3
   Last login Fri 15-Jul-1994 2:59 PM-EDT

   Plan:

   ------------------------------------------------------------------
   Gary C. Kessler
   Adjunct Faculty Member, Graduate College

   Senior Member of Technical Staff
   Hill Associates               +1 802-655-8633 or 655-0940 (office)
   17 Roosevelt Highway          +1 802-655-7974 (fax)
   Colchester, VT  05446         +1 802-879-5242 (home)
   INTERNET:  kumquat@smcvax.smcvt.edu or kumquat@hill.com
   ------------------------------------------------------------------

** C:\> FINGER @SMCVAX.SMCVT.EDU
   [smcvax.smcvt.edu]
   Friday, July 15, 1994 4:00PM-EDT   Up 21 03:41:31
   7+0 Jobs on SMCVAX  Load ave  0.24 0.31 0.25

    User     Personal Name       Subsys
   DENIS     Denis Stratford     MAIL
   GOODWIN   Dave Goodwin        RTPAD
   JAT       John Trono          EDT
   KUMQUAT   Gary Kessler        MAIL
   INFO      SMC Info Service    TELNET
   SYSTEM    System Manager      *DCL*
   SMITH     Jim Smith           LYNX

   C:\>
   ==================================================================
```

2.4. TRACEROUTE

Traceroute is another common TCP/IP tool, this one allowing users to learn about the route that packets take from their local host to a remote host. Although used often by network and system managers as a simple, yet powerful, debugging aid, traceroute can be used by end users to learn something about the structure of the Internet.

The Traceroute command has the following general format (where "#" represents a positive integer value associated with the qualifier):

```
TRACEROUTE [-m #] [-q #] [-w #] [-p #] {IP_address | host_name}
```


where -m is the maximum allowable TTL value, measured as the number of hops allowed before the program terminates (default = 30)

-q is the number of UDP packets that will be sent with each time-to-live setting (default = 3)
-w is the amount of time, in seconds, to wait for an answer from a particular router before giving up (default = 5)
-p is the invalid port address at the remote host (default = 33434)

The Traceroute example below shows the route between a host at St. Michael's College in Colchester, Vermont (smcvax.smcvt.edu) and a host at Bellcore in Red Bank, New Jersey (thumper.bellcore.com). The output has some interesting points:

1. NEARnet, the New England Academic and Research Network, is a regional network serving the northeastern U.S. The packets' route runs from St. Mike's NEARnet gateway (smc-gw) to the University of Vermont (uvm-gw), etc. Note that some intermediate systems (see lines 4 and 16) do not have names associated with them.

2. From NEARnet (lines 1-6), the packets travel on the National Science Foundation Network (NSFNET) T3 backbone (lines 7-11). The NSFNET backbone nodes are identified as "ans.net" since the NSFNET is operated by Advanced Networks and Services, Inc. (ANS). The packets travel within ANS' network on their core nodal switching subsystems ("cnss") until ready to jump off the backbone; line 11 indicates an ANS exterior nodal switching subsystem ("enss"). The datagrams are then carried on the JvNCnet (lines 12-16), a regional network in New Jersey (note the use of SMDS!). Finally, the datagrams are placed on Bellcore's internal network (lines 17 and 18) for final delivery.

3. Note that not all of the datagrams take the same route. In particular, only two of the datagrams go through the ANS gateway referred to at line 10. Note also line 17; here, the first two datagrams go through one router at Bellcore, while the third datagram goes through a companion router.

TECHNICAL NOTE: Traceroute works by sending a sequence of User Datagram Protocol (UDP) datagrams to an invalid port address at the remote host. Using the default settings, three datagrams are sent, each with a Time-To-Live (TTL) field value set to one. The TTL value of 1 causes the datagram to "timeout" as soon as it hits the first router in the path; this router will then respond with an ICMP Time Exceeded Message (TEM) indicating that the datagram has expired. Another three UDP messages are now sent, each with the TTL value set to 2, which causes the second router to return ICMP TEMs. This

process continues until the packets actually reach the other destination. Since these datagrams are trying to access an invalid port at the destination host, ICMP Destination Unreachable Messages are returned indicating an unreachable port; this event signals the

Traceroute program that it is finished! The Traceroute program displays the round-trip delay associated with each of the attempts.

As an interesting aside, Traceroute did not begin life as a general-purpose utility, but as a quick-and-dirty debugging aid used to find a routing problem. The code (complete with comments!) is available by anonymous FTP in the file "traceroute.tar.Z" from the host "ftp.ee.lbl.gov". (See Section 2.5 for a discussion of anonymous FTP.)

```
==================================================================
** SMCVAX$ TRACEROUTE THUMPER.BELLCORE.COM
   traceroute to THUMPER.BELLCORE.COM (128.96.41.1), 30 hops max, 38
   byte packets
    1 smc-gw.near.net (192.80.64.5) 50 ms  20 ms  10 ms
    2 uvm-gw.near.net (131.192.152.1) 160 ms  50 ms  30 ms
    3 harvard-gw.near.net (131.192.65.1) 470 ms  60 ms  60 ms
    4 131.192.32.3 (131.192.32.3) 50 ms  50 ms  40 ms
    5 mit2-gw.near.net (131.192.7.1) 50 ms  40 ms  40 ms
    6 enss.near.net (192.54.222.6) 60 ms  90 ms  40 ms
    7 t3-2.Hartford-cnss49.t3.ans.net (140.222.49.3) 70 ms 100 ms  60 ms
    8 t3-3.Hartford-cnss48.t3.ans.net (140.222.48.4) 70 ms  40 ms  40 ms
    9 t3-2.New-York-cnss32.t3.ans.net (140.222.32.3) 50 ms  60 ms  70 ms
   10 * t3-0.New-York-cnss33.t3.ans.net (140.222.33.1) 340 ms  110 ms
   11 t3-0.enss137.t3.ans.net (140.222.137.1) 90 ms  420 ms  190 ms
   12 zaphod-gateway.jvnc.net (192.12.211.65) 70 ms  50 ms  70 ms
   13 airport1-gateway.jvnc.net (130.94.6.250) 390 ms  110 ms  60 ms
   14 airport4-gateway.jvnc.net (130.94.7.4) 70 ms  50 ms  60 ms
   15 coreSMDS-gateway.jvnc.net (130.94.7.106) 80 ms  130 ms  100 ms
   16 128.96.58.2 (128.96.58.2) 80 ms  70 ms  100 ms
   17 lab214b-cisco.cc.bellcore.com (128.96.34.40) 120 ms  120 ms
      lab214-cisco.cc.bellcore.com (128.96.34.101) 130 ms
   18 thumper.bellcore.com (128.96.41.1) 130 ms  430 ms  80 ms

   SMCVAX$
   ==================================================================
```


2.5. FTP

The File Transfer Protocol (FTP) [16] is one of the most useful and powerful TCP/IP utilities for the general user. FTP allows users to upload and download files between local and remote hosts. Anonymous

FTP, in particular, is commonly available at file archive sites to allow users to access files without having to pre-establish an account at the remote host. The general form of the FTP command is:

```
FTP [IP_address | host_name]
```

As shown, FTP can be initiated in several ways. In the example shown below, an FTP control connection is initiated to a host by supplying a host name with the FTP command; optionally, the host's IP address in dotted decimal form could be used. If neither host name nor IP address are supplied in the command line, a connection to a host can be initiated by typing "OPEN host_name" or "OPEN IP_address" once the FTP application has been started.

The remote host will now ask for a username and password. If a legitimate, registered user of this host supplies a valid username and password, then the user will have access to any files and directories to which this username has privilege. For anonymous FTP access, the username "anonymous" is used and the password (not shown in actual use) is "guest" (although an increasing number of systems ask that anonymous FTP users supply their Internet address as the password).

The first command issued in the example below is "help ?", used to obtain a list of available FTP commands and help topics. Although not always shown, nearly all TCP/IP applications have a help command.

An example of the help for FTP's "type" command is shown in the sample dialogue. This command is very important one, by the way; if transferring a binary or executable file, be sure to set the type to "image" (or "binary" on some systems).

The "dir" command provides a directory listing of the files in the current directory at the remote host; the UNIX "ls" command may also usually be used. Note that an FTP data transfer connection is established for the transfer of the directory information to the local host. The output from the "dir" command will show a file listing that is consistent with the native operating system of the remote host. Although the TCP/IP suite is often associated with UNIX, it can (and does) run with nearly all common operating systems.

The directory information shown in the sample dialogue happens to be in UNIX format and includes the following information:

- o File attributes. The first character identifies this as a directory (d), link (l), or individual file (-). The next nine characters list the access permissions for three groups, namely, the owner, the owner's group, and all other users. Three access privileges may be assigned to each file for each of these groups: read (r), write (w), execute (x), and/or search (s).

- o File owner and owner's group.

- o File size, in bytes.

- o Date of last modification. If the date is followed by a timestamp, then the date is from the current year.

- o File name.

After the directory information has been transferred, FTP closes the data transfer connection.

The command "cd" is used to change to another directory, in this case the "Gov" directory (note that file and directory names may be case-sensitive). As in DOS, "cd .." will change to the parent of the current directory. The "CWD command successful" is the only indication that the user's "cd" command was correctly executed; the "show-directory" (may be truncated to fewer characters, as shown) command, if available, may be used to see which directory you are in.

Another "dir" command is used to find all files ending with the characters ".act"; note the use of the "*" wildcard character. We can now copy (download) the file of choice (The Fair Credit Reporting Act, 1992) by using the "get" (or "receive") command, which has the following general format:

```
GET  remote_file_name  local_file_name
```

FTP opens another data transfer connection for this file transfer purpose; note that the effective data transfer rate is 39.98 kbps.

FTP's "put" (or "send") command allows uploading from the local host to the remote. "Put" is often not available when using anonymous FTP.

Finally, we terminate the FTP connection by using the "close" command. The user can initiate another FTP connection using the "open" command or can leave FTP by issuing a "quit" command. "Quit" can also be used to close a connection and terminate a session.

TECHNICAL NOTE: It is important to note that different FTP packages have different commands available and even those with similar names may act differently. In the example shown here (using MultiNet for VMS), the "show" command will display the current directory; in another package (e.g., FTP Software's PC/TCP), "show" will display a file from the remote host at the local host. Some packages have nothing equivalent to either of these commands!

```
   ================================================================
** SMCVAX$ FTP FTP.SPIES.COM
   SMCVAX.SMCVT.EDU MultiNet FTP user process 3.2(106)
   Connection opened (Assuming 8-bit connections)
** Username: ANONYMOUS
** Password: GUEST

** WIRETAP.SPIES.COM> HELP ?
   Commands may be one of the following:
   ACCOUNT                         AGET
   APPEND                          APUT
   ASCII                           ATTACH
   BELL                            BINARY
   BYE                             BYTE
   CD                              CDUP
   CLOSE                           CONFIRM
   CPATH                           CREATE-DIRECTORY
   CWD                             DELETE
   DIRECTORY                       DISCONNECT
   EXIT                            EXIT-ON-ERROR
   GET                             HASH
   HELP                            LCD
   LDIR                            LOCAL-CD
   LOCAL-DIRECTORY                 LOCAL-PWD
   LOGIN                           LPWD
   LS                              MDELETE
   MGET                            MKDIR
   MODE                            MPUT
   MULTIPLE                        PASSWORD
   PORT                            PROMPT-FOR-MISSING-ARGUMENTS
   PROMPT-ON-CONNECT               PUSH
   PUT                             PWD
   QUIT                            QUOTE
   RECEIVE                         REMOTE-HELP
   REMOVE-DIRECTORY                RENAME
   RETAIN                          RM
   RMDIR                           SEND
   SHOW-DIRECTORY                  SITE
   SPAWN                           STATISTICS
   STATUS                          STREAM
```



```
   STRUCTURE                       TAKE
   TENEX                           TYPE
   USER                            VERBOSE
   VERSION

** WIRETAP.SPIES.COM> HELP TYPE
   The TYPE command changes the FTP transfer type.  The possible
   arguments to the TYPE command are ASCII, IMAGE, BACKUP, and
```

LOGICAL-BYTE ASCII type is used for transferring ASCII text files. IMAGE type is used for transferring binary files. BACKUP type is used for transferring VAX/VMS backup savesets with 2048 byte block size.

```
** WIRETAP.SPIES.COM> DIR
   <Opening ASCII mode data connection for /bin/ls.
   total 25
   drwxr-xr-x  2 9013     daemon      512 Jul  1  1993 .cap
   drwxr-xr-x  4 9013     daemon      512 Jul  1  1993 About
   -rw-r--r--  1 9013     daemon      791 Apr  6  1993 About_Gopher
   drwxr-xr-x  3 9013     daemon      512 Jul 12  1993 Books
   drwxr-xr-x 13 9013     daemon      512 Jul  1  1993 Clinton
   lrwxrwxrwx  1 root     daemon       12 Feb 26 07:02 Economic_Plan
   -> Gov/Economic
   drwxr-xr-x  4 9013     daemon      512 Jul  1  1993 Etext
   lrwxrwxrwx  1 root     daemon       13 Feb 26 07:01 GAO_Reports ->
   Gov/GAO-Trans
   drwxr-xr-x 29 9013     daemon     1024 Feb  3 00:15 Gov
   drwxr-xr-x 16 9013     daemon      512 Jul  1  1993 Library
   lrwxrwxrwx  1 root     daemon        9 Feb 26 06:56 NAFTA ->
   Gov/NAFTA
   drwxr-xr-x  2 9013     daemon      512 Jul  1  1993 Other
   drwxr-xr-x  3 9013     daemon     3072 Apr  7 20:59 alt.etext
   drwxr-xr-x  8 root     42          512 Jul  1  1993 ba.internet
   dr-xr-xr-x  2 bin      wheel       512 Jul  1  1993 bin
   drwxr-xr-x  2 root     daemon      512 Feb 15 06:14 dev
   drwxr-xr-x  3 root     wheel       512 Jul  1  1993 etc
   drwxr-xr-x 11 9038     daemon      512 Dec 17 05:37 game_archive
   drwx-wx-wx  3 root     daemon     1024 Apr 18 02:09 incoming
   drwxr-xr-x  3 root     ftp         512 Oct 29 02:35 pub
   drwxr-xr-x  2 root     daemon      512 Jul  1  1992 tmp
   drwxr-xr-x  3 root     daemon      512 Jul  1  1993 usr
   drwxr-xr-x  3 9013     42         1024 Jul  1  1993 waffle
   <Transfer complete.
   1490 bytes transferred at 4966 bps.
   Run time = 10. ms, Elapsed time = 2400. ms.

** WIRETAP.SPIES.COM> CD Gov
   <CWD command successful.
```



```
** WIRETAP.SPIES.COM> SHOW
   <"/Gov" is current directory.

** WIRETAP.SPIES.COM> DIR *.act
   <Opening ASCII mode data connection for /bin/ls.
   -rw-r--r--  1 9013     42        32695 Dec 10 21:37 brady.act
   -r--r--r--  1 9013     42       168649 Mar 26  1993 disable.act
   -r--r--r--  1 9013     42        62602 Mar 30  1993 ecpa.act
   -r--r--r--  1 9013     42        29519 Mar 30  1993 faircredit.act
```

```
-r--r--r--  1 9013     42        57206 Mar 30  1993 privacy.act
-r--r--r--  1 9013     42        16261 Mar 26  1993 warpower.act
<Transfer complete.
401 bytes transferred at 7638 bps.
Run time = 0. ms, Elapsed time = 420. ms.

** WIRETAP.SPIES.COM> GET faircredit.act FAIRCRDT.TXT
<Opening ASCII mode data connection for faircredit.act (29519
bytes).
<Transfer complete.
30132 bytes transferred at 39976 bps.
Run time = 40. ms, Elapsed time = 6030. ms.

** WIRETAP.SPIES.COM> QUIT
<Goodbye.
SMCVAX$
================================================================
```

2.6. TELNET

TELNET [17] is TCP/IP's virtual terminal protocol. Using TELNET, a user connected to one host can login to another host, appearing like a directly-attached terminal at the remote system; this is TCP/IP's definition of a "virtual terminal." The general form of the TELNET command is:

```
TELNET  [IP_address | host_name]  [port]
```

As shown, a TELNET connection is initiated when the user enters the "TELNET" command and supplies either a "host_name" or "IP_address"; if neither are given, TELNET will ask for one once the application begins.

In the example below, a user logged onto a PC on a LAN will use TELNET to attach to the remote host "smcvax.smcvt.edu". Once logged in via TELNET, the user can do anything on the remote host that they could do if they were on a directly-connected terminal or had dialed-up by modem. The commands that are used are those available on the remote system to which the user is attached. In the sample dialogue

below, the user attached to SMCVAX will use basic VAX/VMS commands:

- The "dir" command lists the files having a "COM" file extension.
- The "mail" command enters the MAIL system (there are no messages).
- "Pinging" the home host shows that it is alive!

When finished, "logout" logs the user off the remote host; TELNET automatically closes the connection to the remote host and returns control to the local system.

It is important to note that TELNET is a very powerful tool, one that may provide users with access to many Internet utilities and services that might not be otherwise available. Many of these features are accessed by specifying a port number with the TELNET command, in addition to a host's address, and knowledge of port numbers provides another mechanism for users to access information with Telnet.

This guide discusses several TCP/IP and Internet utilities that require local client software, such as Finger, Whois, Archie, and Gopher. But what if your software does not include a needed client? In some cases, Telnet may be used to access a remote client and provide the same functionality.

This is done by specifying a port number with the TELNET command. Just as TCP/IP hosts have a unique IP address, applications on the host are associated with an address, called a "port". Finger, for example, is associated with the well-known port number 79. In the absence of a Finger client, TELNETing to port 79 at a remote host may provide the same information. You can "finger" another host with TELNET by using a command like:

```
TELNET host_name 79
```

Other well-known TCP/IP port numbers include 20 (FTP data transfer), 21 (FTP control), 25 (SMTP), 43 (whois), 70 (Gopher), and 185 (KNOWBOT).

Some services are available on the Internet using TELNET and special port numbers. A geographical information database, for example, may be accessed by TELNETing to port 3000 at host "martini.eecs.umich.edu"; current weather information is available at port 3000 at hosts "downwind.sprl.umich.edu" and "wind.atmos.uah.edu".


```
   ================================================================
** C:\> TELNET SMCVAX.SMCVT.EDU
   FTP Software PC/TCP tn 2.31 01/07/94 12:38
   Copyright (c) 1986-1993 by FTP Software, Inc. All rights reserved

   - Connected to St. Michael's College -

** Username: KUMQUAT
** Password:

   St. Michael's College VAX/VMS System.
```

```
   Node SMCVAX.

       Last interactive login on Thursday,  9-JUN-1994 11:55
       Last non-interactive login on Thursday,  9-JUN-1994 08:20

   Good Afternoon User KUMQUAT.  Logged in on 12-JUN-1994 at 3:27 PM.

   User [GUEST,KUMQUAT] has 4292 blocks used, 5708 available,
   of 10000 authorized and permitted overdraft of 100 blocks on $1$DIA2

** SMCVAX$ DIR *.COM
   Directory $1$DIA2:[GUEST.KUMQUAT]

   BACKUP.COM;24          24  16-JUL-1990 16:22:46.68  (RWED,RWED,RE,)
   DELTREE.COM;17          3  16-JUL-1990 16:22:47.58  (RWED,RWED,RE,)
   EXPANDZ.COM;7           2  22-FEB-1993 10:00:04.35  (RWED,RWED,RE,)
   FTSLOGBLD.COM;3         1  16-JUL-1990 16:22:48.57  (RWED,RWED,RE,)
   FTSRRR.COM;2            1  16-JUL-1990 16:22:48.73  (RWED,RWED,RE,)
   LOGIN.COM;116           5   1-DEC-1993 09:33:21.61  (RWED,RWED,RE,)
   SNOOPY.COM;6            1  16-JUL-1990 16:22:52.06  (RWED,RWED,RE,)
   SYLOGIN.COM;83          8  16-JUL-1990 16:22:52.88  (RWED,RWED,RE,RE)
   SYSHUTDWN.COM;1         0  16-JUL-1990 16:22:53.04  (RWED,RWED,RE,)
   SYSTARTUP.COM;88       15  16-JUL-1990 16:22:53.21  (RWED,RWED,RE,)
   WATCH_MAIL.COM;1      173  10-MAY-1994 09:59:52.65  (RWED,RWED,RE,)

   Total of 11 files, 233 blocks.

** SMCVAX$ MAIL
** MAIL> EXIT

** SMCVAX$ PING HILL.COM /N=5
   PING HILL.COM (199.182.20.4): 56 data bytes
   64 bytes from 199.182.20.4: icmp_seq=0 time=290 ms
   64 bytes from 199.182.20.4: icmp_seq=1 time=260 ms
   64 bytes from 199.182.20.4: icmp_seq=2 time=260 ms
   64 bytes from 199.182.20.4: icmp_seq=3 time=260 ms
   64 bytes from 199.182.20.4: icmp_seq=4 time=260 ms
```



```
   ----HILL.COM PING Statistics----
   5 packets transmitted, 5 packets received, 0% packet loss
   round-trip (ms)  min/avg/max = 260/266/290

** SMCVAX$ LOGOUT
     KUMQUAT      logged out at 12-JUN-1994 15:37:04.29

   Connection #0 closed

   C:\>
   ================================================================
```

2.7. User Database Lookup Tools

2.7.1. WHOIS/NICNAME

WHOIS and NICNAME are TCP/IP applications that search databases to find the name of network and system administrators, RFC authors, system and network points-of-contact, and other individuals who are registered in appropriate databases. The original NICNAME/WHOIS protocol is described in RFC 954 [4].

WHOIS may be accessed by TELNETing to an appropriate WHOIS server and logging in as "WHOIS" (no password is required); the most common Internet name server is located at the Internet Network Information Center (InterNIC) at "rs.internic.net". This specific database, in particular, only contains INTERNET domains, IP network numbers, and points of contact; policies governing the InterNIC database are described in RFC 1400 [19]. The MILNET database resides at "nic.ddn.mil" and PSI's White Pages pilot service is located at "psi.com".

Many software packages contain a WHOIS/NICNAME client that automatically establishes the TELNET connection to a default name server database, although users can usually specify any name server database that they want.

The accompanying dialogues shows several types of WHOIS/NICNAME information queries. In the session below, we request information about an individual (Denis Stratford) by using WHOIS locally, a specific domain (hill.com) by using NICNAME locally, and a high-level domain (edu) using TELNET to a WHOIS server.


```
   ================================================================
** SMCVAX$ WHOIS STRATFORD, DENIS
   Stratford, Denis (DS378)      denis@@SMCVAX.SMCVT.EDU
      St. Michael's College
      Jemery Hall, Room 274
      Winooski Park
      Colchester, VT 05439
      (802) 654-2384

      Record last updated on 02-Nov-92.
   SMCVAX$

** C:\> NICNAME HILL.COM
```

```
   Hill Associates (HILL-DOM)
      17 Roosevelt Highway
      Colchester, VT 05446

      Domain Name: HILL.COM

      Administrative Contact:
         Kessler, Gary C.  (GK34)  kumquat@HILL.COM
         (802) 655-8633
      Technical Contact, Zone Contact:
         Monaghan, Carol A.  (CAM4)  cam@HILL.COM
         (802) 655-8630

      Record last updated on 15-Jun-94.

      Domain servers in listed order:

      NETCOMSV.NETCOM.COM   192.100.81.101
      NS.NETCOM.COM              192.100.81.105
** C:\> TELNET RS.INTERNIC.NET
   Connected to RS.INTERNIC.NET, a SUN 670 running SUNOS-4.1.3

   ************************************************************
   * -- InterNIC Registration Services Center  --
   ************************************************************

   Cmdinter Ver 1.3 Mon Mar 21 13:42:27 1994 EST
** [dec-vt220] InterNIC> WHOIS
   Connected to the rs Database
   InterNIC WHOIS Version: 1.0 Mon, 21 Mar 94 13:42:32

** Whois: DOMAIN EDU
   Education top-level domain (EDU-DOM)
      Network Solutions, Inc.
      505 Huntmar park Dr.
```



```
      Herndon, VA 22070

      Domain Name: EDU

      Administrative Contact, Technical Contact, Zone Contact:
       Network Solutions, Inc.  (HOSTMASTER)  HOSTMASTER@INTERNIC.NET
       (703) 742-4777 (FAX) (703) 742-4811

      Record last updated on 16-May-94.

      Domain servers in listed order:

      NS.INTERNIC.NET              198.41.0.4
      AOS.ARL.ARMY.MIL             128.63.4.82, 192.5.25.82
```

```
      NS1.ISI.EDU                 128.9.0.107
      C.NYSER.NET                 192.33.4.12
      TERP.UMD.EDU                128.8.10.90
      NS.NASA.GOV                 128.102.16.10, 192.52.195.10
      NIC.NORDU.NET               192.36.148.17
      NS.NIC.DDN.MIL              192.112.36.4

 Would you like to see the known domains under this top-level domain?
** Y

      There are 1504 known sub-domains:

      0.EDU            Reserved Domain
      1.EDU            Reserved Domain
      2.EDU            Reserved Domain
      22CF.EDU         22nd Century Foundation
      3.EDU            Reserved Domain
** There are 1499 more matches.  Show them? N

** Whois: EXIT

** [dec-vt220] InterNIC> QUIT

   Connection #0 closed
   C:\>
   ====================================================================
```


2.7.2. KNOWBOT

KNOWBOT is an automated username database search tool that is related to WHOIS. The Knowbot Information Service (KIS) provides a simple WHOIS-like interface that allows users to query several Internet user databases (White Pages services) all at one time. A single KIS query will automatically search the InterNIC, MILNET, MCImail, and PSI White Pages Pilot Project; other databases may also be included.

KNOWBOT may be accessed by TELNETing to port 185 at host "info.cnri.reston.va.us" or "sol.bucknell.edu". The "help" command will supply sufficient information to get started. The sample dialogue below shows use of the "query" command to locate a user named "Gary Kessler"; this command automatically starts a search through the default set of Internet databases.

```
   ====================================================================
** C:\> TELNET INFO.CNRI.RESTON.VA.US 185

                    Knowbot Information Service
   KIS Client (V2.0).    Copyright CNRI 1990.    All Rights Reserved.

   Please enter your email address in our guest book...
** (Your email address?) > KUMQUAT@HILL.COM

** > QUERY KESSLER, GARY

   Trying whois at ds.internic.net...
   The ds.internic.net whois server is being queried:
   No match for "KESSLER and GARY"

   The rs.internic.net whois server is being queried:

   Kessler, Gary C. (GK34)          kumquat@HILL.COM
      Hill Associates
      17 Roosevelt Highway
      Colchester, VT 05446
      (802) 655-8633

   The nic.ddn.mil whois server is being queried:

   Kessler, Gary P. (GK15)          sa75@TECNET1.JCTE.JCS.MIL
      NAVAL AIR WARFARE CENTER-AD PAX
      Simulation & Control Technology Dept
      SATD
      Patuxent River, MD 20670
      301-826-3192 (DSN) 326-3192 (FAX) 301-826-4555
      MILNET TAC user (Issued: 11-jul-1994)
```



```
      TAC authorizing host: TECNET1.JCTE.JCS.MIL (NATC-3COM)

   Trying mcimail at cnri.reston.va.us...
   Trying ripe at whois.ripe.net...
   Trying whois at whois.lac.net...
   No match found for .KESSLER,GARY

** > QUIT
   KIS exiting
   Connection #0 closed
   C:\>
   ====================================================================
```

2.7.3. NETFIND

NETFIND is another tool that may be used to locate people on the

network. NETFIND's advantage is that it searches for users by utilizing extant tools such as Finger and SMTP, thus providing the potential to find any user on any host without relying on databases. For NETFIND to be successful, however, the system manager of existing systems must set up Finger and SMTP to respond correctly to NETFIND's queries. NETFIND is still relatively new and use will grow over time.

NETFIND is a menu-driven, text-based system. Users need to TELNET to an available NETFIND server. Once connected, login as "netfind" (must be lower-case; no password required) and follow the menu prompts. The sample dialogue below shows the search for "Tom Maufer", who is known to work at Goddard Space Flight Center ("gsfc") at NASA ("nasa.gov").

The primary NETFIND server is located at the University of Colorado in Boulder (bruno.cs.colorado.edu); alternate servers include:

```
archie.au (AARNet, Melbourne, Australia)
dino.conicit.ve (Nat. Council for Tech. & Sci. Res., Venezuela)
ds.internic.net (InterNIC Directory & DB Svcs., S. Plainfield, NJ)
eis.calstate.edu (California State University, Fullerton, CA)
krnic.net (Korea Network Information Center, Taejon, Korea)
lincoln.technet.sg (Technet Unit, Singapore)
malloco.ing.puc.cl (Catholic University of Chile, Santiago)
monolith.cc.ic.ac.uk (Imperial College, London, England)
mudhoney.micro.umn.edu (University of Minnesota, Minneapolis)
netfind.anu.edu.au (Australian National University, Canberra)
netfind.ee.mcgill.ca (McGill University, Montreal, Quebec, Canada)
netfind.fnet.fr (Association FNET, Le Kremlin-Bicetre, France)
netfind.icm.edu.pl (Warsaw University, Warsaw, Poland)
netfind.if.usp.br (University of Sao Paulo, Sao Paulo, Brazil)
```



```
netfind.oc.com (OpenConnect Systems, Dallas, Texas)
netfind.sjsu.edu (San Jose State University, San Jose, California)
netfind.vslib.cz (Liberec Univ. of Technology, Czech Republic)
nic.uakom.sk (Academy of Sciences, Banska Bystrica, Slovakia)
redmont.cis.uab.edu (University of Alabama at Birmingham)

==========================================================================
** C:\> TELNET DS.INTERNIC.NET
   SunOS UNIX (ds)

** login: netfind

   ==================================================
   Welcome to the InterNIC Directory & Database Server
   ==================================================

   Top level choices:
```

```
            1. Help
            2. Search
            3. Seed database lookup
            4. Options
            5. Quit (exit server)
   ** --> 2

   ** Enter person and keys (blank to exit) --> MAUFER GSFC NASA GOV

      Please select at most 3 of the following domains to search:
            0. gsfc.nasa.gov (goddard space flight center, united states
      national aeronautics and space administration, greenbelt, maryland)
            1. antwrp.gsfc.nasa.gov (compton gamma ray observatory
      science support center, goddard space flight center, united states
      national aeronautics and space administration, greenbelt, maryland)
            2. enemy.gsfc.nasa.gov (compton gamma ray observatory science
      support center, goddard space flight center, united states national
      aeronautics and space administration, greenbelt, maryland)
            3. upolu.gsfc.nasa.gov (goddard space flight center, united
      states national aeronautics and space administration, greenbelt,
      maryland)

   ** Enter selection (e.g., 2 0 1) --> 0
      ( 1) SMTP_Finger_Search: checking domain gsfc.nasa.gov
      Mail is forwarded to tom@stimpy.gsfc.nasa.gov
      NOTE: this is a domain mail forwarding arrangement - mail intended
            for "maufer" should be addressed to "tom@gsfc.nasa.gov"
            rather than "tom@stimpy.gsfc.nasa.gov".
```



```
      ( 1) SMTP_Finger_Search: checking host stimpy.gsfc.nasa.gov
      ------
      Domain search completed.  Proceeding to host search.
      ------

      SYSTEM: kong.gsfc.nasa.gov
              Login name: maufer          In real life: Tom Maufer - CBSI
              Directory: /vault/maufer    Shell: /bin/csh
              Last login Fri Sep 24, 1993 on ttypc from rocinante.gsfc.n
              No unread mail
              No Plan.

      FINGER SUMMARY:
      - The most promising email address for "maufer"
        based on the above finger search is
        tom@gsfc.nasa.gov.

   ** Continue the search ([n]/y) ? --> N
```

```
** Enter person and keys (blank to exit) -->

   Top level choices:
           1. Help
           2. Search
           3. Seed database lookup
           4. Options
           5. Quit (exit server)
** --> 5
   Exiting Netfind server...

   Connection #0 closed
   C:\>
   ======================================================================
```


2.8. Information Servers

2.8.1. ARCHIE

Archie is a tool for locating files on the Internet, originally developed at the Computer Science Department at McGill University in Montreal. Archie allows users to find software, data, and other information files that reside at anonymous FTP archive sites across the Internet; the name of the program, reportedly, is derived from the word "archive" and not from the comic book character. Archie tracks the contents of over 1,000 anonymous FTP archive sites containing over 2 million files. The Archie server automatically updates the information from each registered site about once a month, providing relatively up-to-date information without unduly stressing the network.

Before using Archie, you must identify a server address. The sites below all support Archie; most (but not all) Archie sites support the "servers" command which lists all known Archie servers. Due to the

popularity of Archie and its high processing demands, many sites limit access to non-peak hours and/or limit the number of simultaneous Archie users. Available Archie sites include:

archie.au	139.130.4.6	Australia
archie.edvz.uni-linz.ac.at	140.78.3.8	Austria
archie.univie.ac.at	131.130.1.23	Austria
archie.uqam.ca	132.208.250.10	Canada
archie.funet.fi	128.214.6.100	Finland
archie.th-darmstadt.de	130.83.22.60	Germany
archie.ac.il	132.65.6.15	Israel
archie.unipi.it	131.114.21.10	Italy
archie.wide.ad.jp	133.4.3.6	Japan
archie.hana.nm.kr	128.134.1.1	Korea
archie.sogang.ac.kr	163.239.1.11	Korea
archie.uninett.no	128.39.2.20	Norway
archie.rediris.es	130.206.1.2	Spain
archie.luth.se	130.240.18.4	Sweden
archie.switch.ch	130.59.1.40	Switzerland
archie.ncu.edu.tw	140.115.19.24	Taiwan
archie.doc.ic.ac.uk	146.169.11.3	United Kingdom
archie.unl.edu	129.93.1.14	USA (NE)
archie.internic.net	198.48.45.10	USA (NJ)
archie.rutgers.edu	128.6.18.15	USA (NJ)
archie.ans.net	147.225.1.10	USA (NY)
archie.sura.net	128.167.254.179	USA (MD)

Archie servers may be accessed using TELNET. When TELNETing to an Archie site, login as "archie" (you MUST use lower case); just hit <ENTER> if a password is requested.

Once connected, the "help" command assists users in obtaining more information about using Archie. Two more useful Archie commands are "prog", used to search for files in the database, and "whatis", which searches for keywords in the program descriptions.

In the accompanying dialogue, the "set maxhits" command is used to limit the number of responses to any following "prog" commands; if this is not done, the user may get an enormous amount of information!

In this example, the user issues a request to find entries related to "mpeg", ISO's Moving Pictures Experts Group video compression standard. Armed with this information, a user can use anonymous FTP to examine these directories and files.

The next request is for files with "security" as a keyword descriptor. These responses can be used for subsequent "prog"

commands.

Exit archie using the "exit" command. At this point, TELNET closes the connection and control returns to the local host.

Additional information about Archie can be obtained by sending e-mail to Bunyip Information Systems (archie-info@bunyip.com). Client software is not required to use Archie, but can make life a little easier; some such software can be downloaded using anonymous FTP from the "/pub/archie/" directory at host "ftp.cs.widener.edu" or in "/pub/archie/clients/" at "ftp.sura.net". Most shareware and commercial Archie clients hide the complexity described in this section; users usually connect to a pre-configured Archie server merely by typing an "ARCHIE" command line.

```
==================================================================
** C:\> TELNET 129.93.1.14
   SunOS UNIX (crcnis2)

** login: archie
** Password:

    Welcome to the ARCHIE server at the University of Nebraska - Lincoln

   # Bunyip Information Systems, 1993

** unl-archie> HELP
   These are the commands you can use in help:
```



```
            .    go up one level in the hierarchy

            ?    display a list of valid subtopics at the current level

   <newline>
   done, ^D, ^C  quit from help entirely

        <string>  help on a topic or subtopic
   Eg.
         "help show"

   will give you the help screen for the "show" command

         "help set search"

   Will give you the help information for the "search" variable.

   The command "manpage" will give you a complete copy of the archie
   manual page.
** help> DONE
```

```
** unl-archie> SET MAXHITS 5
** unl-archie> PROG MPEG
   # Search type: sub.
   # Your queue position: 1
   # Estimated time for completion: 02:18

   Host ftp.germany.eu.net    (192.76.144.75)
     Location: /pub/applications/graphics
       DIRECTORY    drwxrwxr-x     512 bytes  00:00  7 Jul 1993  mpeg
     Location: /pub/comp/amiga/gfx
       DIRECTORY    drwxr-xr-x     512 bytes  00:00  7 Sep 1993  mpeg

   Host stsci.edu    (130.167.1.2)
     Location: /stsci/epa
       DIRECTORY    drwxr-xr-x     512 bytes  12:55 21 Jun 1994  mpeg

   Host ftp.nau.edu    (134.114.64.70)
     Location: /graphics
       DIRECTORY    drwxr-xr-x     512 bytes  04:51  3 Apr 1994  mpeg

   Host gum.isi.edu    (128.9.32.31)
     Location: /share/in-notes/media-types/video
       FILE    -rw-r--r--      15 bytes  18:45 11 Jan 1994  mpeg

** unl-archie> WHATIS SECURITY
   RFC 1037          Greenberg, B.; Keene, S. NFILE - a file access
                      protocol. 1987 December; 86 p.
```



```
   RFC 1038          St. Johns, M. Draft revised IP security option.
                      1988 January; 7 p.
   cops              System Security analysis tool
   forktest          Find security holes in shell-escapes
   kerberos          Host security package
   safe-mkdir        mkdir() and security hole *****FIX****

** unl-archie> EXIT
   # Bye.
   Connection #0 closed
   C:\>
   ================================================================
```

2.8.2. GOPHER

The Internet Gopher protocol was developed at the University of Minnesota's Microcomputer Center in 1991, as a distributed information search and retrieval tool for the Internet. Gopher is described in RFC 1436 [1]; the name derives from the University's mascot.

Gopher provides a tool so that publicly available information at a

host can be organized in a hierarchical fashion, allowing it to be perused using a simple menu system. Gopher allows a user to view a file on demand without requiring additional file transfer protocols. Gopher also has the capability to "link" gophers on the Internet, so that each Gopher site can be used as a stepping stone to access other sites and reducing the amount of duplicate information and effort on the network.

In many cases, users can access Gopher by TELNETing to a valid Gopher location; if the site provides a remote Gopher client, the user will see a text-based, menu interface. The number of Gopher sites is growing rapidly; as the dialogue below shows, most Gopher sites have a menu item that will allow you to identify other Gopher sites. If using TELNET, login with the username "gopher" (this MUST be in lowercase); no password is required. Note that not all Gopher sites provide a remote Gopher client; users may need local Gopher client software on their system.

The Gopher server at "ds.internic.net" has a tremendous amount of information for the new user, including lists of frequently asked questions and pointers to various Internet discussion lists. In the sample dialogue below, the remote Gopher client is accessed by TELNETing to the host. With the menu interface shown here, the user merely follows the prompts. Initially, the main menu will appear; selecting item 2 causes Gopher to seize and display the "InterNIC Information Services" menu. Move to the desired menu item by typing

the item number or by moving the "pointer" (-->) down to the desired entry using the <DOWN-ARROW> key on the keyboard, and then hitting <ENTER>. To quit the program at any time, press "q" (quit); "?" and "u" will provide help or go back up to the previous menu, respectively. Users may also search for strings within files using the "/" command or download the file being interrogated using the "D" command.

Menu item 7 (selected in the dialogue shown here) is titled "Beginners: Start Here", an excellent place for new users to obtain information about the Internet, available tools, terms and concepts, and, perhaps most importantly, some of the cultural aspects of the Internet community.

Further information about Gopher can be obtained by contacting the Internet Gopher Team at the University of Minnesota in Minneapolis (gopher@boombox.micro.umn.edu). This is also the site of the first Gopher server (consultant.micro.umn.edu). A Gopher-related discussion list is maintained at gopher-news@boombox.micro.umn.edu (see Section 3.1 for information on subscribing to Internet discussion lists). More information on Gopher clients can be found in the Gopher Frequently Asked Questions (FAQ) file, which can be downloaded using anonymous FTP in file

"/pub/usenet/news.answers/gopher-faq" at the host "rtfm.mit.edu";
this FAQ also lists sources for a number of Gopher clients for a wide
range of hardware/software platforms.

==========

```
** SMCVAX$ TELNET DS.INTERNIC.NET

   SunOS UNIX (ds)

** login: gopher
   SunOS Release 4.1.3 (DS) #3: Tue Feb 8 10:52:45 EST 1994

   ******************************************************************
            Welcome to the InterNIC Directory and Database Server.
   ******************************************************************

   Internet Gopher Information Client v1.11
   Root gopher server: ds0.internic.net

   --> 1.  Information About the InterNIC/
       2.  InterNIC Information Services (General Atomics)/
       3.  InterNIC Registration Services (NSI)/
       4.  InterNIC Directory and Database Services (AT&T)/

   Press ? for Help, q to Quit                              Page: 1/1
```



```
** View item number: 2


   Internet Gopher Information Client v1.11
   InterNIC Information Services (General Atomics)

   --> 1.  README.
       2.  About the InfoGuide/
       3.  About InterNIC Information Services/
       4.  About the Internet/
       5.  Getting Connected to the Internet/
       6.  Beginners: Start Here/
       7.  Using the Internet/
       8.  Internet Resources/
       9.  Advanced Users: NIC Staff, System Administrators, Programmer
       10. Frequently Asked Questions at InterNIC IS/
       11. Scout Report/
       12. WAIS search InfoGuide (and elsewhere) by keyword/
       13. InfoGuide INDEX.

   Press ? for Help, q to Quit                              Page: 1/1
** View item number: 6
```

```
   Internet Gopher Information Client v1.11
   Beginners: Start Here

   --> 1.  About This Directory.
       2.  Introductions to the Internet/
       3.  Glossaries And Definitions/
       4.  Network Tools/
       5.  Further Reading/
       6.  Collection of Usenet FAQs/
       7.  Internet Culture and Netiquette/

   Press ? for Help, q to Quit                                  Page: 1/1
** q
   Really quit (y/n) ?
** y

   Connection closed by Foreign Host
   SMCVAX$
   ================================================================
```


2.8.3. Other Information Servers

There are a number of other information servers that are growing in popularity and use. The problem with being blessed with so much information from Archie, Gopher, and other sources is exactly that - too much information. To make it easier for users to locate the system on which their desired information resides, a number of other tools have been created.

Veronica (Very Easy Rodent-Oriented Net-wide Index to Computerized Archives) was developed at the University of Nevada in Reno as an adjunct to Gopher. As the number of Gopher sites continues to grow, it has become increasingly harder to find information in "Gopherspace" since Gopher is designed to search a single database at a time. Veronica maintains an index of titles of Gopher items and performs a keyword search on all of the Gopher sites that it has knowledge of and access to, obviating the need for the user to perform a menu-by-menu, site-by-site search for information. When a user selects an item from the menu of a Veronica search, "sessions" are automatically established with the appropriate Gopher servers, and a list of data items is returned to the originating Gopher client in the form of a Gopher menu so that the user can access the files.

Veronica is available as an option on many Gopher servers, including "internic.net".

Another Gopher-adjunct is Jughead (Jonzy's Universal Gopher Hierarchy Excavation And Display). Jughead supports key word searches and the use of logical operators (AND, OR, and NOT). The result of a Jughead search is a display of all menu items which match the search string which are located in the University of Manchester and UMIST Information Server, working from a static database that is re-created every day. Jughead is available from many Gopher sites (including "internic.net"), although Veronica may be a better tool for global searches.

Archie and Gopher are primarily used for the indexing of text-based files. The World Wide Web (WWW or W3) Project, initiated by the CERN Institute for Particle Physics in Geneva, Switzerland, is designed to combine aspects of information retrieval with multimedia communications. The WWW Project is intended to allow users to access information in many different types of formats, including text, sound, image, and video. WWW treats all searchable Internet files as hypertext documents. "Hypertext" is a new term which merely refers to text that contains pointers to other text, allowing a user reading one document to jump to another document for more information on a given topic, and then return to the same location in the original document. The original WWW site is at CERN and may be accessed via

Telnet at "nxoc01.cern.ch". The user will be automatically logged in and a help menu can be displayed by entering the "h" command.

To generally access WWW servers, users must run client software called a "browser". The browser reads documents from WWW servers and can access files by FTP, gopher, and other methods. WWW can also handle hypermedia documents; "hypermedia" is another new term, referring to a file using any medium that contains pointers to another medium. WWW browsers, then, are able to display images, sound, or animations in addition to text. WWW sources and additional information may be accessed via anonymous FTP from the "/pub/WWW" directory at "info.cern.ch" or the "/Web" directory at "ftp.ncsa.uiuc.edu".

The most commonly used WWW browser is Mosaic, developed at the National Center for Supercomputer Applications (NCSA) at the University of Illinois. Mosaic provides a uniform mechanism for finding the location of information, as well as determining the data type, presentation method, and linkages to other information. A large number of shareware Mosaic clients are available at "ftp.ncsa.uiuc.edu". It should be noted that commercial versions of Mosaic will also become available for a variety of platforms after the summer of 1994.

The Wide Area Information Server (WAIS, pronounced "ways") was initiated jointly by Apple Computer, Dow Jones, KMPG Peat Marwick,

and Thinking Machines Corp. It is a set of free-ware, share-ware, and commercial software products for a wide variety of hardware/software platforms, which work together to help users find information on the Internet. WAIS provides a single interface through which a user can access many different information databases.

The user interface allow a query to be formulated in English and the WAIS server will automatically choose the appropriate databases to search. Further information about WAIS can be obtained by reading the WAIS FAQ, from host "rtfm.mit.edu" in file "/pub/usenet/news.answers/wais-faq".

2.9. Uniform Resource Locator Format

As more and more protocols have become available to identify files, archive and server sites, news lists, and other information resources on the Internet, it was inevitable that some shorthand would arise to make it a little easier to designate these sources. The common shorthand that is employed is called the Uniform Resource Locator (URL) format.

The list below provides information on how the URL format should be interpreted for the protocols and resources that have been discussed in this document. A complete description of the URL format may be found in [2].

file://"host"/"directory"/"file-name"
Used to identify a specific file. E.g., the file "htmlasst" in the "edu" directory at host "ftp.cs.da" would be denoted with URL as:
<URL:file://ftp.cs.da/edu/htmlasst>

ftp://"user":"password"@"host":"port"/"directory"/"file-name"
Used to identify an FTP site. E.g.:
<URL:ftp://ftp.eff.org/pub/EFF/Policy/Crypto/*>

gopher://"host":"port"/"gopher-path"
Used to identify a Gopher site and menu path. E.g.:
<URL:gopher://info.umd.edu:901/info/Government/Factbook92>

http://"host":"port"/"directory"/"file-name"?"searchpart"
Used to identify a WWW server location. "http" refers to the HyperText Transport Protocol; file names commonly use the ".html" extension, indicating use of the HyperText Markup Language. E.g.:
<URL:http://info.isoc.org/home.html>

mailto:"e-mail address"
Identifies an individual Internet mail address. E.g.:
<URL:mailto:sds@hill.com>

telnet://"user":"password"@"host":"port"/
Identifies a TELNET site (the trailing "/" is optional). E.g.:
<URL:telnet//envnet:henniker@envnet.gsfc.nasa.gov>

3. Discussion Lists

Among the most useful features of the Internet are the discussion lists that have become available to allow individuals to discuss topics of mutual concern. Discussion list topics range from SCUBA diving and home brewing of beer to AIDS research and foreign policy. Several, naturally, deal specifically with the Internet, TCP/IP protocols, and the impact of new technologies.

Most of the discussion lists accessible from the Internet are "unmoderated", meaning that anyone can send a message to the list's central repository and the message will then be automatically forwarded to all subscribers of the list. These lists provide very fast turn-around between submission of a message and delivery, but often result in a lot of messages (including inappropriate "junk mail"). A "moderated" list has an extra step; a human list moderator

examines all messages before they are forwarded to ensure that the messages are appropriate to the list and not needlessly inflammatory!

Users should be warned that some lists generate a significant amount of messages each day. Before subscribing to too many lists, be sure that you are aware of local policies and/or charges governing access to discussion lists and e-mail storage.

3.1. Internet Discussion Lists

A list of the known interest groups may be found by Gophering to "ds.internic.net". Follow the menu path "InterNIC Information Services" | "Using the Internet" | "Basic Internet Services" | "Electronic Mail" | "Mailing Lists" to find the 8-part list of lists.

Be careful if you download these files; the list is nearly 1.5 MB in size, listing over 800 lists! Along the way, you will find a wealth of other information.

Mail can be sent to an Internet list at an address with the following form:

list_name@host_name

The common convention when users want to subscribe, unsubscribe, or handle any other administrative matter is to send a message to the list administrator; do NOT send administrivia to the main list address! The list administrator can usually be found at:

list_name-REQUEST@host_name

To subscribe to a list, it is often enough to place the word "subscribe" in the main body of the message, although a line with the format:

SUBSCRIBE list_name your_full_name

will satisfy most mail servers. A similar message may be used to get off a list; just use the word "unsubscribe".

Not every list follows this convention, but it is a safe bet if you don't have better information!

3.2. Usenet

Usenet, also known as NETNEWS or Usenet news, is another information source with its own set of special interest mailing lists organized into "newsgroups". Usenet originated on UNIX systems but has

migrated to many other types of hosts, although most Usenet servers are still UNIX-based. Usenet clients, called "newsreaders", are available for virtually any operating system.

While Usenet newsgroups are usually accessible at Internet sites, a prospective Usenet client host must have appropriate newsreader software to be able to read news. Users will have to check with their local host or network administrator to find out what Usenet newsgroups are locally available, as well as the local policies for using them.

Usenet newsgroup names are hierarchical in nature. The first part of the name, called the "hierarchy", provides an indication about the general subject area. There are two types of hierarchies, called "mainstream" and "alternative"; the total number of newsgroups is in the thousands. The "news.announce.newusers" newsgroup is a good place for new Usenet users to find a detailed introduction to the use of Usenet, as well as an introduction to its culture.

Usenet mainstream hierarchies are established by a process that requires the approval of a majority of Usenet members. Most sites that receive a NETNEWS feed receive all of these hierarchies, which include:

comp	Computers
misc	Miscellaneous
news	Network news
rec	Recreation
sci	Science

soc	Social issues
talk	Various discussion lists

The alternative hierarchies include lists that may be set up at any site that has the server software and disk space. These lists are not formally part of Usenet and, therefore, may not be received by all sites getting NETNEWS. The alternative hierarchies include:

alt	Alternate miscellaneous discussion lists
bionet	Biology, medicine, and life sciences
bit	BITNET discussion lists
biz	Various business-related discussion lists
ddn	Defense Data Network
gnu	GNU lists
ieee	IEEE information
info	Various Internet and other networking information
k12	K-12 education
u3b	AT&T 3B computers
vmsnet	Digital's VMS operating system

A list of newsgroups may be found at host "rtfm.mit.edu" in the path "/pub/usenet/news.answers"; see the "/active-newsgroups" and "/alt-hierarchies" subdirectories.

There is often some overlap between Usenet newsgroups and Internet discussion lists. Some individuals join both lists in these circumstances or, often, there is cross-posting of messages. Some Usenet newsgroup discussions are forwarded onto an Internet mailing list by an individual site to provide access to those users who do not have Usenet available.

Users not connected to Usenet may post messages to a Usenet newsgroup using Internet e-mail. First, replace the periods in the Usenet discussion list name with hyphens (e.g., the folk music discussion list, "rec.music.folk", would become "rec-music-folk"). Then, send an e-mail message to:

newsgroup_name@CS.UTEXAS.EDU

Usenet news may be read using Gopher. Connect to the host "gopher.msu.edu" using the path "News & Weather" | "USENET News" or host "gopher.bham.ac.uk" using the path "Usenet News Reader".

3.3. BITNET/EARN

Another important set of discussion groups is maintained using a program called LISTSERV. LISTSERV is a service provided widely on BITNET and EARN (European Academic and Research Network), although it is also available to Internet users.

LISTSERV commands are placed in the main body of e-mail messages sent to an appropriate list server location. To find out what lists are available, send a message to "listserv@bitnic.educom.edu" with the command "list global" in the main body of the message; whatever you place in the "Subject:" field will be ignored.

Once you have found a list of interest, you can send a message to the appropriate address with any appropriate command, including:

HELP	Get help & a list of commands
SUBSCRIBE list_name your_full_name	Subscribe to a list
UNSUBSCRIBE list_name	Unsubscribe from a list
INDEX	Get a list of LISTSERV files
GET file_name	Obtain a file from the server

4. Internet Documentation

To fully appreciate and understand what is going on within the Internet community, users might wish to obtain the occasional Internet specification. The main body of Internet documents are Request for Comments (RFCs), although a variety of RFC subsets have been defined for various specific purposes. The sections below will describe the RFCs and other documentation, and how to get these documents.

NOTE: For complete, up-to-date information on obtaining Internet documentation, users should Gopher to "ds.internic.net" and follow the path "InterNIC Information Services" | "About the Internet" | "Internet Documentation", and then select the desired set of documents. This Gopher path is referred to as the "documentation root path" in the remainder of this section.

4.1. Request for Comments (RFCs)

RFCs are the body of literature comprising Internet protocols, standards, research questions, hot topics, humor (especially those dated 1 April), and general information. Each RFC is uniquely issued a number which is never reused or reissued; if a document is revised, it is given a new RFC number and the old RFC is said to be "obsoleted." Announcements are sent to the RFC-DIST mailing list whenever a new RFC is issued; anyone may join this list by sending e-mail to "rfc-request@nic.ddn.mil".

RFCs may be obtained through the mail (i.e., postal service), but it is easier and faster to get them on-line. One easy way to obtain RFCs on-line is to use RFC-INFO, an e-mail-based service to help

users locate and retrieve RFCs and other Internet documents. To use the service, send e-mail to "rfc-info@isi.edu" and leave the "Subject:" field blank; commands that may go in the main body of the message include:

```
HELP                          (Help file)
HELP: ways_to_get_rfcs        (Help file on how to get RFCs)

RETRIEVE: RFC
   Doc-ID: RFCxxxx            (Retrieve RFC xxxx; use all 4 digits)

LIST: RFC                     (List all RFCs...)
  [options]                      (...[matching the following options])

  KEYWORDS: xxx                (Title contains string "xxx")
  AUTHOR: xxx                  (Written by "xxx")
  ORGANIZATION:                (Issued by company "xxx")
```



```
  DATED-AFTER: mmm-dd-yyyy
  DATED-BEFORE: mmm-dd-yyyy
  OBSOLETES: RFCxxxx          (List RFCs obsoleting RFC xxxx)
```

An alternative way to obtain RFCs by e-mail is to send an e-mail message to "service@nic.ddn.mil", leaving the "Subject:" field blank.

In the main body of the message, use one or more of the following commands. The RFC index, or a specific reference to an RFC, will indicate whether the RFC is available in ASCII text or PostScript format. By convention, all RFCs are available in ASCII while some are also available in PostScript where use of graphics and/or different fonts adds more information or clarity. The instructions below show how to get the index; be aware that this file is very large, containing the citing for over 1,700 documents. Note that not all RFCs numbered below 698 (July 1975) are available on-line:

```
SEND HELP                   (Help file)
SEND RFC/RFC-INDEX          (RFC Index)
SEND RFC/RFCxxxx.TXT        (ASCII version of RFC xxxx)
SEND RFC/RFCxxxx.PS         (PostScript version of RFC xxxx)
```

TABLE 1. Some of the RFC Repositories.

REGION	HOST ADDRESS	DIRECTORY
U.S.	nic.ddn.mil	rfc
U.S.	nisc.jvnc.net	rfc
U.S.	ftp.isi.edu	in-notes
U.S.	wuarchive.wustl.edu	info/rfc
U.K.	src.doc.ic.ac.uk	rfc

```
Europe     funet.fi              rfc
Pacific    munnari.oz.au         rfc
-----------------------------------------
```

To obtain an RFC via anonymous FTP, connect to one of the RFC repositories listed in Table 1 using FTP. After connecting, change to the appropriate RFC directory (as shown in Table 1) using the "cd" command. To obtain a particular file, use the "get" command:

```
GET RFC-INDEX.TXT local_name    (RFC Index)
GET RFCxxxx.TXT   local_name    (ASCII version of RFC XXXX)
GET RFCxxxx.PS    local_name    (PostScript version of RFC XXXX)
```

Finally, check out the path "RFC's (Request for Comments)" under the documentation root path for the RFC index, complete instructions on obtaining RFCs, and a complete set of RFCs.

The sample dialogue below, although highly abbreviated, shows a user obtaining RFC 1594 (Answers to Commonly asked "New Internet User" Questions) using the first three methods described above.

```
   ================================================================
** SMCVAX$ MAIL
** MAIL> SEND
** To: IN%"SERVICE@NIC.DDN.MIL"
** Subject:
   Enter your message below. Press CTRL/Z when complete, CTRL/C to quit
** SEND RFC/RFC1594.TXT
** ^Z
** MAIL> EXIT

** SMCVAX$ MAIL
** MAIL> SEND
** To: IN%"RFC-INFO@ISI.EDU"
** Subject:
   Enter your message below. Press CTRL/Z when complete, CTRL/C to quit
** RETRIEVE: RFC
** Doc-ID: RFC1594
** ^Z
** MAIL> EXIT

** SMCVAX$ FTP NIC.DDN.MIL
** Username: ANONYMOUS
** Password:
** NIC.DDN.MIL> CD rfc
** NIC.DDN.MIL> GET rfc1594.txt RFC-1594.TXT
** NIC.DDN.MIL> EXIT
   SMCVAX$
   ================================================================
```

4.2. Internet Standards

RFCs describe many aspects of the Internet. By the early 1990s, however, so many specifications of various protocols had been written that it was not always clear as to which documents represented standards for the Internet. For that reason, a subset of RFCs have been designated as STDs to identify them as Internet standards.

Unlike RFC numbers that are never reused, STD numbers always refer to the latest version of the standard. UDP, for example, would be completely identified as "STD-6/RFC-768." Note that STD numbers refer to a standard, which is not necessarily a single document; an STD, therefore, might refer to several RFCs. STD 19, for example, is the NetBIOS Service Protocols standard and comprises RFCs 1001 and 1002; a complete citation for this standard would be "STD-19/RFC-

1001/RFC-1002."

The availability of new STDs is announced on the RFC-DIST mailing list. STD-1 [14] always refers to the latest list of "Internet Official Protocol Standards". The Internet standards process is described in RFC 1602 [6] and STD notes are explained in RFC 1311 [15].

STDs can be obtained as RFCs via anonymous FTP from any RFC repository. In addition, some RFC sites (such as "nic.ddn.mil") provide an STD directory so that STD documents can be found in the path "/STD/xx.TXT", where "xx" refers to the STD number.

STD documents may be obtained as RFCs using the methods described in Section 4.1. STDs may also be obtained via the RFC-INFO server using the "RETRIEVE: STD" and "Doc-ID: STDxxxx" commands. Also, check out the path "STD's (Standard RFC's)" under the documentation root path for the STD index, complete instructions on obtaining STDs, and a complete set of STDs.

4.3. For Your Information Documents

The For Your Information (FYI) series of RFCs provides Internet users with information about many topics related to the Internet. FYI topics range from historical to explanatory to tutorial, and are aimed at the wide spectrum of people that use the Internet. The FYI series includes answers to frequently asked questions by both beginning and seasoned users of the Internet, an annotated bibliography of Internet books, and an explanation of the domain name system.

Like the STDs, an FYI number always refers to the latest version of an FYI. FYI 4, for example, refers to the answers to commonly asked questions by new Internet users; its complete citation would be "FYI-

4/RFC-1594." The FYI notes are explained in FYI 1 [9].

FYIs can be obtained as RFCs via anonymous FTP from any RFC repository. In addition, some RFC sites (such as "nic.ddn.mil") provide an FYI directory so that FYI documents can be found in the path "/FYI/xx.TXT", where "xx" refers to the FYI number.

FYI documents may be obtained as RFCs using the methods described in Section 4.1. FYIs may also be obtained via the RFC-INFO server using the "RETRIEVE: FYI" and "Doc-ID: FYIxxxx" commands. Also, check out the path "FYI's (For Your Information RFC's)" under the documentation root path for the FYI index, complete instructions on obtaining FYIs, and a complete set of FYIs.

4.4. RARE Technical Reports

The Reseaux Associes pour la Recherche Europeenne (RARE) is the Association of European Research Networks and their users. RARE's charter is to promote and participate in the creation of a high-quality European computer communications infrastructure for the support of research endeavors. RARE member networks use Open Systems Interconnection (OSI) protocols and TCP/IP. Since the summer of 1993, to promote a closer relationship between RARE and the IETF, RARE Technical Reports (RTRs) are also published as RFCs.

RTR documents may be obtained as RFCs using the methods described in Section 4.1. RTRs may also be obtained via the RFC-INFO server using the "RETRIEVE: RTR" and "Doc-ID: RTRxxxx" commands. Also, check out the path "RTR's (RARE Technical Report RFC's)" under the documentation root path for the RTR index, complete instructions on obtaining RTRs, and a complete set of RTRs. They may also be obtained via anonymous FTP from "ftp.rare.nl".

NOTE: As of December 1994, RARE and EARN have merged to form TERENA (Trans-European Research and Education Network Association).

5. Perusing the Internet...

This guide is intended to provide the reader with a rudimentary ability to use the utilities that are provided by TCP/IP and the Internet. By now, it is clear that the user's knowledge, ability, and willingness to experiment are about the only limits to what can be accomplished.

The next step is to explore the nooks and crannies of the network. One software tool that will users in this quest is the Merit Computer Center's (Ann Arbor, MI) "Cruise of the Internet", available at no cost from the host "nic.merit.edu" using FTP. For more information, read the "readme" files in the directories "internet/resources/

cruise.mac" and "internet/resources/cruise.dos" for Mac and PC versions, respectively. For general information about resources at this site, see the READ.ME file in the root directory or send e-mail to "nic-info@nic.merit.edu".

Several RFCs provide invaluable information about finding things on the Internet. One of the best such sources is FYI 10/RFC 1402, titled "There's Gold in them thar Networks! -or- Searching for Treasure in all the Wrong Places" [11], an excellent guide for someone who wants to look around the Internet for a wide range of material. Other good sources include the "Hitchhiker's Guide to the Internet" (RFC 1118) [7] and the "Guide to Network Resource Tools" (FYI 23/RFC 1580) [3]. Answers to frequently asked questions for

both new and experienced users of the Internet may be found in FYI 4/RFC 1594 [10] and FYI 7/RFC 1207 [8], respectively.

There are many other sources that cite locations from which to access specific information about a wide range of subjects using such tools as FTP, Telnet, Gopher, and WWW. These include:

- The INTERNET SERVICES LIST, maintained by Scott Yanoff of the University of Wisconsin in Milwaukee and updated at least once a month. This list can be obtained at <URL:ftp://ftp.csd.uwm.edu/pub/inet.services.txt> or <URL:gopher://csd4.csd.uwm.edu/Remote Information Services/Special Internet Connections>.

- An excellent starting point for searching the World Wide Web is to point your WWW browser at "http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/StartingPoints/NetworkStartingPoints.html".

- The Scout Report is a weekly service by the InterNIC Information Services team. To subscribe to the Scout Report mailing list, send e-mail to "majordomo@is.internic.net" and place the line "subscribe scout-report" in the main body of the message. Optionally, Gopher to "ds.internic.net" and follow the path "InterNIC Information Services" | "Scout Report" or point your WWW browser at "http://www.internic.net/infoguide.html".

- "The INTERNET Yellow Pages" by Harley Hahn and Rick Stout [28].

More books and specialized articles came out about the Internet in 1993 and 1994 than in all previous years (squared!). Some of them are directly related to finding your way around, or finding things on, the Internet; a very partial list includes:

- "The Internet Directory" by Eric Braun [21]

- "The MAC Internet Tour Guide", "The PC Internet Tour Guide", and "The Windows Internet Tour Guide" by Michael Fraase [24, 25, 26]

- o "The Internet Navigator" by Paul Gilster [27]

- o "Zen and the Art of the Internet" by Brendan Kehoe [29]

- o "The Whole Internet User's Guide & Catalog" by Ed Krol [31]

- o "INTERNET: Getting Started" by April Marine, Susan Kirkpatrick, Vivian Neou, and Carol Ward [33]

- o "Finding it on the Internet: The Next Challenge for Librarianship" by Brian Nielsen [34]

- o "Navigating the Internet" by Richard Smith and Mark Gibbs [35]

A much more comprehensive list of Internet-related books may be found in FYI 19/RFC 1463 [5].

Finally, Carl Malamud has written a delightful book called "Exploring the Internet: A Technical Travelogue" [32], chronicling not the Internet as much as the people who built it and use it. This book will not teach you how to perform an anonymous FTP file transfer nor how to use Gopher, but provides insights about our network (and Carl's gastro-pathology) that no mere statistics can convey.

6. Acronyms and Abbreviations

ASCII	American Standard Code for Information Interchange
BITNET	Because It's Time Network
DDN	Defense Data Network
DNS	Domain Name System
EARN	European Academic Research Network
FAQ	Frequently Asked Questions list
FTP	File Transfer Protocol
FYI	For Your Information series of RFCs
HTML	HyperText Markup Language
HTTP	HyperText Transport Protocol
ICMP	Internet Control Message Protocol
IP	Internet Protocol
ISO	International Organization for Standardization
NetBIOS	Network Basic Input/Output System
NIC	Network Information Center
NICNAME	Network Information Center name service
NSF	National Science Foundation
NSFNET	National Science Foundation Network
RFC	Request For Comments
RARE	Reseaux Associes pour la Recherche Europeenne
RTR	RARE Technical Reports
SMDS	Switched Multimegabit Data Service
SMTP	Simple Mail Transfer Protocol

STD	Internet Standards series of RFCs
TCP	Transmission Control Protocol
TTL	Time-To-Live
UDP	User Datagram Protocol
URL	Uniform Resource Locator
WAIS	Wide Area Information Server
W3	World Wide Web
WWW	World Wide Web

7. Security Considerations

Security issues are not discussed in this memo.

8. Acknowledgements

Our thanks are given to all sites where we FTPed, TELNETed, GOPHERed, and otherwise used system resources, particularly St. Michael's College in Colchester, Vermont (smcvax.smcvt.edu). We also appreciate the comments and suggestions from our colleagues at Hill Associates, our students, and other members of the Internet community, particularly Mark Delany and the rest of the gang at the Australian Public Access Network Association, Margaret Hall (BBN), John Martin (RARE), Tom Maufer (NASA), Michael Patton (BBN), and Brian Williams. Special thanks are due to Joyce Reynolds for her continued encouragement and direction.

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